

Building a Database for a Quantitative Model

A database can greatly benefit a quantitative analysis. The defining characteristic of a quantitative risk, or reliability, model is the use of failure estimate data. Models can easily contain a thousand Basic Events, relying on hundreds of individual data sources. Obviously, entering so much data by hand will eventually lead to errors. Not so obviously entering data this way does not aid linking the Basic Events to the data sources.

The best way to organize large amounts of data on a computer is with a database. But a model does not require a large, enterprise-level database with dedicated developers and administrators. A database built in Excel can be quite sufficient.

A simple spreadsheet database can link every Basic Event to the individual data source selected for them. This database can also contain the manipulations appropriate for how the data is used in the model. These manipulations include stressing factors based on use and maintenance cycles, dormancy, unique failure modes, the modeling of multiple items as a single "Super component" Basic Event, and Bayesian Updating based on flight and testing experience. A simple, unique metadata field in both the model and database provides a link from any Basic Event in the model to its data source and all relevant calculations.

The credibility for the entire model often rests on the credibility and traceability of the data.